REMARKS

Claims 1-13 are pending in this application. Claim 1 is herein amended. No new matter has been entered.

Support for amended claim 1 may be found within the application specification, as originally filed, for example, page 25, lines 6-9.

I. The Rejection Based on Sugino et al. and Kawabata in view of Admitted Prior Art

Claims 1-7 and 10-13 are rejected under 37 U.S.C. §103(a) as being unpatentable over Sugino et al. (U.S. 2003/0189754) in view of Kawabata (JP2002-328233; submitted IDS). Applicants respectfully traverse this rejection.

The polarizing plate of the presently claimed invention is comprised of a polarizer and a protective film prepared on one or both sides of the polarizer, and the polarizer and the protective film are adhered with an adhesive. To the contrary, in Sugino, a polarizing plate is being formed by adhering a polarizer and a protective film without using an adhesive. This difference in making the polarizing plate, with or without the adhesive, is a patentable difference in the presently claimed invention from Sugino. From such a difference, with or without the adhesive, the protective film of Sugino results in a two-layered film (PET film) having each different softening point. This is seen in Fig. 1 of Sugino.

From the above-mentioned difference, this explains that Sugino could not be considered to use the protective film as in the presently claimed invention, wherein an in-plane retardation (Re) is to be controlled within the range of 10 nm or less, and a thickness-direction retardation (Rth) is to be controlled within the range of -30 to 10nm.

That is, even if the PET film of Sugino may be controlled to an Re of 10 nm or less, Sugino cannot control Rth to as little as -30 to 10 nm. The reason will be explained in the following.

The reason why Rth becomes larger in a PET film

The softening point (thermal deflection temperature) of the unstretched PET is 68°C (glass transition temperature Tg = 76°C), and it is generally known to raise a softening point by carrying out biaxial stretching of the unstretched PET to allow oriented crystallization. See Attachments, Attachment A, Plastics Data Book, page 490 and Attachment B, All of Converting – From the Past to the Future, page 197.

The PET film used in Example 1 of Sugino comprises the two-layered structure, each having a softening point of 130°C and 145° C. Accordingly, it can be considered that the PET film having the softening point, as described in Sugino, was obtained by crystallization through a stepwise secondary stretching, etc. at a temperature that is higher than Tg and lower than the melting point.

The stretched PET film thus obtained causes the retardation (Re, Rth) as a result of the orientation by stretching during the production process. As for Re, controlling the range is made possible by controlling the stretching ratio in the longitudinal/transversal direction in the plane so that the orientation in the longitudinal/transversal direction becomes approximately equal to each other (i.e. allowing nx and ny to be equal to each other). In Example 1 of Sugino, there is a description that Re is 3 nm, assuming that the orientation in the longitudinal/ transversal direction becomes approximately equal to each other.

On the other hand, it is difficult to control the Rth to -30 to 10 nm in Sugino. The reason is that. although it is necessary to control each orientation in the longitudinal/ transversal direction approximately equal as mentioned above so as to have the softening point of the PET film at a high temperature of 130°C and 145°C and to control Re small, anisotropy will be caused in the thickness direction even if each orientation in the longitudinal/ transversal direction is approximately equal (the difference between nx and nz becomes larger), and, as a result, retardation will occur in the thickness direction.

As mentioned above, even if Sugino was able to control Re in 10 nm or less using different two-layered films (biaxial PET) as a protective film, Sugino could not control Rth to -30 to 10 nm.

As discussed above, since Sugino does not use an adhesive in adhering the polarizer and the protective film, it would not be obvious to one of ordinary skill in the art at the time of invention to use an adhesive to adhere the polarizer and the protective film as in the presently. Moreover, since an adhesive is not used for adhering the polarizer and the protective film, a protective film with a high Rth is inevitably used in Sugino. Thus, use of a protective film that is controlled in the range of -30 to 10 nm is not achieved in Sugino. Therefore the presently claimed invention is obvious from Sugino.

In addition, Kawabata discloses one layer, alone, in the protective film and thus it is not able to be applied to the two-layered protective film like Sugino. Thus, one of ordinary skill in the art would not combine the disclosure of Kawabata with Sugino given the differences in

layering of the protective film. Furthermore, in Sugino there is no disclosure concerning the material of the protective film as described in Kawabata.

Further, since a protective film with a large Rth is inevitably used in Sugino, as mentioned above, it cannot be considered that the use of a protective film with a small Rth, as disclosed in Kawabata, is obvious. That is, it would not have been obvious to one of ordinary skill in the art at the time of invention to use the protective film of Kawabata in the polarizing plate of Sugino due to the differences in Rth of the protective films of Sugino and Kawabata.

The protective films in Comparative Examples 1 and 2 of the present application are large in the thickness-direction retardation. Although the in-plane retardation of TAC is equivalent to that disclosed by Sugino, its thickness-direction retardation is outside the claimed range of the presently claimed invention. Therefore, Sugino does not disclose, teach, suggest or provide any reasoning for this embodiment of Applicants' claimed invention. Thus, one of ordinary skill in the art could not achieve the presently claimed invention from Sugino.

Thus, the deficiencies of Sugino are not overcome by Kawabata, for at least the reasons stated above. Favorable reconsideration is earnestly solicited.

II. The Rejection Based on Sugino et al. and Kawabata in view of Admitted Prior Art

Claims 8 and 9 are rejected under 37 U.S.C. §103(a) as being unpatentable over Sugino et al. (U.S. 2003/0189754) and Kawabata (JP2002-328233; submitted IDS) in view of Admitted Prior Art (Admission). Applicants respectfully traverse this rejection.

The Admitted Prior Art does not overcome the deficiencies in the primary references,

Sugino and Kawabata, as set forth in section I above.

In view of the arguments presented above, Applicants respectfully hold that this rejection is also overcome for at least the reasons stated above.

Favorable reconsideration is earnestly solicited.

In view of the above, Applicants respectfully submit that their claimed invention is allowable and ask that the rejections under 35 U.S.C. §102 and the rejection under 35 U.S.C. §103 be reconsidered and withdrawn. Applicants respectfully submit that this case is in condition for allowance and allowance is respectfully solicited.

If any points remain at issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the local exchange number listed below.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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LCW/BKM/bam
Attachments: Attachment A) Plastics Data Book
Attachment B) All of Converting – From the Past to the Future

Attachment A

Reference 1-2

(1) The first print of the first edition published on December 1, 1999,

(2) Plastics Data Book

(3) The price is displayed on the case.

(4) Seal of approval for publishing, abolished

(5) Pages out of order /missing pages will be replaced.

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Reference 1-1

(2) Properties and use of PET

1) Characteristics table of Mitsui PET J series

(Example of PET from Mitsui Chemicals Inc.)

Physical properties item	Unit	Test method	J005 (Amorphous product)	J120	J125	J135
Basic characteristics						
IV	dl/g	Mitsui Chemicals' method	0.61	0.73	0.77	0.82
Density	Kg/m^3	ASTEM D 792	1340	1400	1400	1400
Thermal properties						
Melting point	°C	DSC method	255	-	-	-
Glass transition temperature	°C	DSC method	76	76	77	77
Thermal deformation temperature	°C	ASTEM D 648	68	-	-	-
Others						
Acetaldehyde	ppm ppm	Mitsui Chemicals' method Celanese method		4 or less 2 or less	2 or less 1 or less	2 or less 1 or less
Water content	%	Mitsui Chemicals' method		-	-	-
Mechanical properties						
Tensile yield strength	MPa (kgf/cm^2)	ASTEM D 638	57 (580)	- -	- -	- -

Tensile breaking strength	MPa	ASTEM D 638	59	-	-	-
	(kgf/cm^2)		(600)	-	-	-
Tensile elongation at break	%	ASTEM D 638	200	300	300	300
Tensile modulus	MPa	ASTEM D 638	2,000	-	-	-
	(kgf/cm^2)		(20,000)	-	-	-
Izod impact strength	MPa	ASTEM D 256	50	60	60	70
	($kgf \cdot cm/cm^2$)	Notched	(5)	(6)	(6)	(7
Rockwell hardness	R scale	ASTEM D 785	110	-	-	-
Molding method			Biaxial stretching Blow molding Injection molding Extrusion molding	Biaxial stretching Blow molding Injection molding Extrusion molding	Biaxial stretching Blow molding Extrusion molding	Biaxial stretching Blow molding Extrusion molding
Use			Medical devices Food container	Condiment container Cleanser container	Soft drinks container Alcohols Beverage container	Soft drinks container Alcohols Beverage container

(Mitsui Chemicals Inc.: Technical materials of PET by Mitsui)

(2) PETの特性と用途

1) 三井PET Jシリーズ特性表

（三井化学のPETの例）

物性項目	単位	試験方法	J 005（参考品）	J 120	J 125	J 135
基本特性						
IV	dl/g	三井化学法	0.61	0.73	0.77	0.82
密度	kg/m³	ASTM D 792	1340	1400	1400	1400
熱的特性						
融点	℃	DSC法	255	–	–	–
ガラス転移温度	℃	DSC法	76	76	77	77
熱変形温度	℃	ASTM D 648	69	–	–	–
その他						
アセトアルデヒド	ppm ppm	三井化学法 セミホール法	– –	4以下 2以下	2以下 1以下	2以下 1以下
水分率	%	三井化学法	0.4以下	–	–	–
機械的特性						
引張降伏強さ	MPa (kgf/cm²)	ASTM D 638	57 (580)	– –	– –	– –
引張破断強さ	MPa (kgf/cm²)	ASTM D 638	59 (600)	– –	– –	– –
引張破断伸び	%	ASTM D 638	200	300	300	300
引張弾性率	MPa (kgf/cm²)	ASTM D 638	2,000 (20,000)	– –	– –	– –
アイゾット衝撃強さ	J/m (kgf·cm/cm)	ASTM D 256 (ノッチ付き)	50 (5)	60 (6)	60 (6)	70 (7)
ロックウェル硬さ	Rスケール	ASTM D 785	110	–	–	–
成形方法			二軸延伸 ブロー成形 射出成形 押出成形	二軸延伸 ブロー成形 射出成形 押出成形	二軸延伸 ブロー成形 押出成形	二軸延伸 ブロー成形 押出成形
用途			医療器具 食品容器	調味料容器 化粧品容器	清涼飲料容器 アルコール 飲料容器	清涼飲料容器 アルコール 飲料容器

（三井化学：三井PET技術資料）

2) PETと他レジンとの特性比較

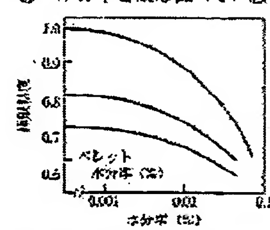
	PET（未延伸）	PE（高密度）	PP	PS	PA（ナイロン6）	PVC（硬質）	PC	試験法 ASTM
比重	1.34	0.96	0.91	1.05	1.14	1.35~1.45	1.19	D-792
引張強さ（降伏） 引張強さ（破断）(MPa)	58.9~62.7	21.4 3.6	31.9 47.1	39.3 61.8	78.4	35.5~62.8	61.8 73.6	D-638 D-638
引張破断伸び (%)	300~400	350	700	2.8	75	2.0~4.0	60~100	D-638
引張弾性率 (MPa)	1,961~3059	1,138~2,246	1,108~1,549	3,236~4,118	2,589	2,412~4,128	2,158~2,452	D-638
曲げ強さ (MPa)	73.4~97.1	6.9	41.4~55.1	60~96.5	107.9	68.9~110.3	93.1~92.2	D-790
曲げ弾性率 (MPa)	2,354~2,844	686~1,108	1,520~1,863	3,314~3,531	2,353	3,353~4,511	1,569~2,942	D-790
圧縮強さ (MPa)	55.6~81.4	18.6~24.8	37.9~55.1	79.3~110.3	82.4	55.1~91.6	71.5~83.4	D-695
圧縮弾性率 (MPa)	1,766~2,256	588~980	1,000~1,588	2,414~3,188	2,255	2,452~3,922	2,352~2,452	D-695
衝撃強度アイゾット（ノッチ付 J/m）	29.4~58.0	42.8~106.9	26.5~106.9	13.3~21.4	70.6	21.5~156.9	745~912	D-256
吸水率 (%)	0.12	<0.015	0.01	0.02	1.6	0.07~0.4	0.23~0.36	D-570
成形収縮率 (%)	0.2	2.0~5.0	1.0~2.5	0.2~0.6	0.8~2.2	0.1~0.5	0.5~0.8	JIS-K-6911

PET：ポリエチレンテレフタレート（ポリエステル） PE：ポリエチレン PP：ポリプロピレン PS：ポリスチレン
PA：ポリアミド PVC：ポリ塩化ビニル PC：ポリカーボネート

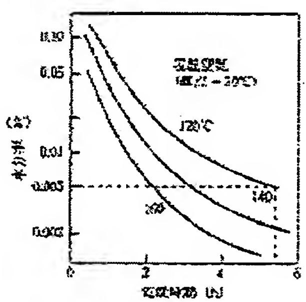
（引用元：合成樹脂，43(2)，30(1997)）

3) その他の特性

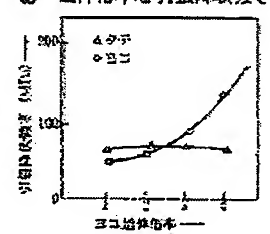
① 水分率と成形品のIV低下の関係



② 乾燥時間と水分率の関係



③ 延伸倍率と引張降伏強さの関係



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Attachment B

Reference 2-3

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Reference 2-1

2. Production of polyester films

Dry PET tips are heat-melted with an extruder, extruded from a T die in uniform thickness over a casting drum, and cooled to produce a sheet. Subsequently, the sheet is passed through a vertical stretching machine provided with heating roll groups each being different in speed so that the sheet is stretched 3 to 4 fold in the longitudinal direction (Machine direction), and then stretched 3 to 4 fold in the transverse direction (Transverse direction) with a tenter type horizontal stretching machine having the preheating, streching, heat-treatment and cooling part, followed by rewinding the sheet. This sheet is slitted to the width and length of a product, thereby to give a product. The above-mentioned streching is performed at a temperature that is higher than the glass transition temperature, and lower than the melting point, and by this process, the molecule is oriented and crystallized to obtain a film excellent in mechanical properties and thermal properties. Moreover, to improve the processing suitability such as adhesion and coating, etc. the corona discharge treatment or the easy adhesive coating might be performed during the processes until the above-mentioned commercialization.

The above-mentioned stretching method is called as the stepwise secondary stretching method, and in this country, most of polyester films are produced by this method. Other than this method, there are the tubular method and the simultaneous biaxial stretching method. Fig. 1 shows an example of the layout drawing of the biaxial stretching machine, and Fig. 2 shows the process of film production.

A film having 0.8 to 350 μ in thickness is produced with the development of various uses of the film over a wide area, and conditions for film production are prescribed carefully according to each type. It is not possible to manufacture films having all thicknesses in one film manufacturing machine, and there are four kinds of machine specifications divided by a range of the thickness, and Table 2 shows a thickness range according to the usage.

Reference 2-2

3-3 Thermal properties

The polyester has a melting point of 264°C, and a glass transition temperature of 68°C in the amorphous part and 81°C in the crystalline part; the available temperature is in a wide range of -60°C to 150°C. When the polyester film is heated for a long time, its tensile strength and elongation become lowered. The relation between the temperature and life-cycle (generally, half-life of the strength and elongation) was shown in Fig.3.

向を図っている。

富士写真フイルムは，磁気テープ用および自社消費中心に製造を開始したが，最近は各種工業材料用途の製品開発を進め，一段外販も行うようになった。

コニカは帝人との合弁設備，新工場において自社用フィルム中心に製造している。

アイシーアイジャパンは，1990年10月茨城事業所に同社のPETフィルムのブランド「メリネックス」の製品プラントを完成し，国内生産を開始した。ライバルのひしめく包装用，磁気テープ用などを避けて写真，プロッピー，エレクトロニクス関連を中心に販売を強化している。

2. ポリエステルフィルムの製造法

乾燥したPETチップを押出機により溶融溶融し，Tダイから薄いな厚さにキャスティングドラム上に押し出し，冷却してシートを製造する。続いて速度の異なる加熱ロール群を持つ縦延伸機にシートを通し，縦方向(Machine Direction)に3～4倍に延伸し，次いで予熱，延伸，熱処理および冷却部を持つテンター式横延伸機を用いて横方向(Transverse Direction)に3～4倍延伸し巻取られる。これを製品幅，長さにスリットし製品とする。以上の延伸はガラス転移温度より高く，融点より低い温度で行われるが，この工程によって分子が配向，結晶化し，機械的性質，熱的性質の良いフィルムが得られる。また後加工等の加工適性を向上させるため上記製品化までの工程でコロナ放電処理あるいは易接着コーティング処理を施す場合がある。

図2　逐次二軸延伸PETフィルムの製膜工程

以上に述べた延伸方式は逐次二次延伸法と呼ばれているもので，我が国においては大半のポリエステルフィルムがこの方式で製造される。この他にチューブラー法，同時二軸延伸法などがある。図1に二軸延伸装置の概略，図2に製膜工程を示す。

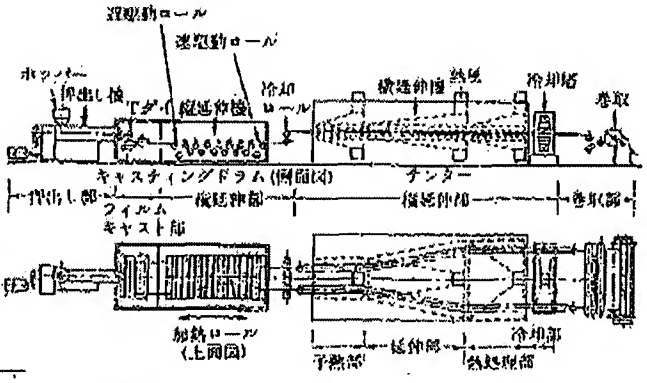
フィルムの各種用途の展開と共に厚さが0.8～350μまで広範囲にわたり生産され，各タイプ別に製造条件がきめ細かく規定されている。この全ての厚さを1台の製膜機で製膜することはできず，厚さの範囲により3種の製膜仕様に分けられる。表2に用途別厚み範囲を示す。

3. ポリエステルフィルムの性質と特長

3－1　物理的性質

密度は1.4 g／cm前後であり，汎用オレフィン系フィルムの0.9～1.0 g／cmより重い。通常の結晶化度は45%前後となるがこれは製膜条件によって変化する。

図1　テンター式延伸



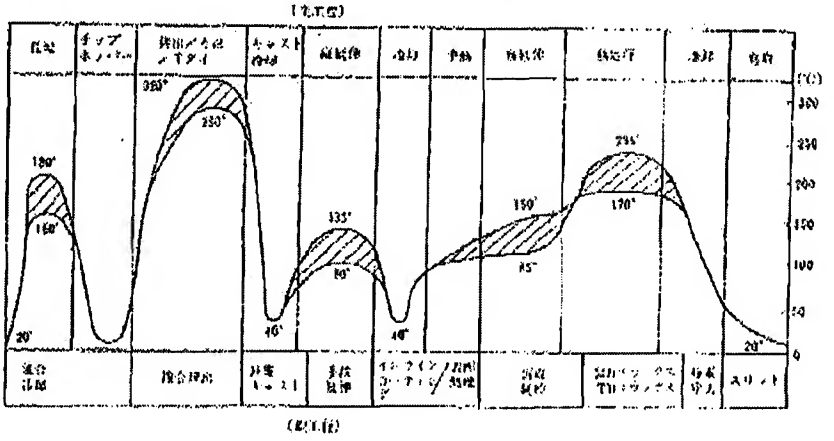
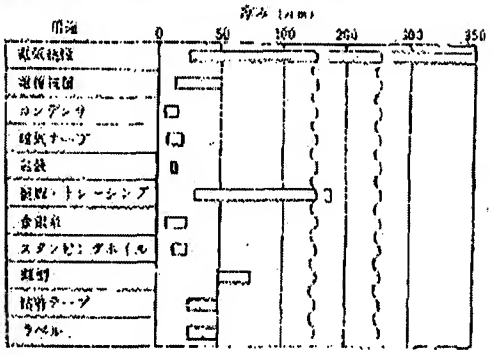


表2 PETフィルムの各用途別厚み範囲



3－2 力学的性質

ポリエステルフィルムは，最も高い引張り強さを示すプラスチックフィルムの一つである。また剛性も高く，引張り弾性率が500kg/㎟程度と高いため，印刷やラミネート時に縦方向にかかる荷重に対する伸びが小さく，加工時の寸法変化が小さい優れたフィルムである。

3－3 熱的性質

ポリエステルの融点は264℃，ガラス転移温度はアモルファス部分69℃，結晶部分121℃であり，使用可能温度範囲は−60℃～150℃と広範囲である。ポリエステルフィルムを長時間加熱すると引裂強さ，伸びは低下していく。温度と寿命（一般的には強伸度の半減期）の関係を図3に示した。

3－4 寸法安定性

ポリエステルフィルムの熱膨張率は（1.7±1.0）×10^{-5}／℃であり，寸法安定性が優れている。±1程度のバラツキが発生する理由については，他の文献を参照して頂きたいが，ラミネート材料としてみる場合大半は問題にならない。

また湿度膨張率は1.2×10^{-5}／%RH程度であり，小さい部類に属する。相対湿度と伸長率の関係を図4に示す。

フィルムを加熱していくと，その寸法は熱収縮と熱収縮を生じて複雑な挙動を示すが，このような挙動を調べるにはTMA（熱機械分析）が用いられる。図5にその一例を示す。

3－5 化学的性質

ポリエステルフィルムの耐薬品性は非常に優れており，一般的に油脂類，有機溶剤，酸に対しては耐性がある。表3に耐薬品性を示す。通常の有機溶剤には強いが芳香族ハロゲン，ニトロベンゼン，オルソクロロフェノールに溶解する。また苛性ソーダ，アンモニア水などのアルカリには弱い。

熱劣化については先に述べたが，これは乾熱劣化についてのものであった。水分共存下の熱劣化では加水分解のため，乾熱時より急速な劣化を生じるので要注意である。

図3 強度残率50%時を寿命とするフィルムの寿命推定

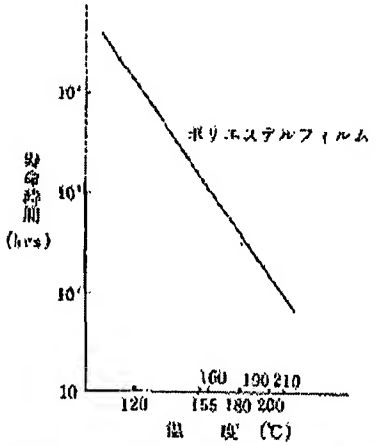


図4 相対湿度と伸長率（湿度−温度膨張率）

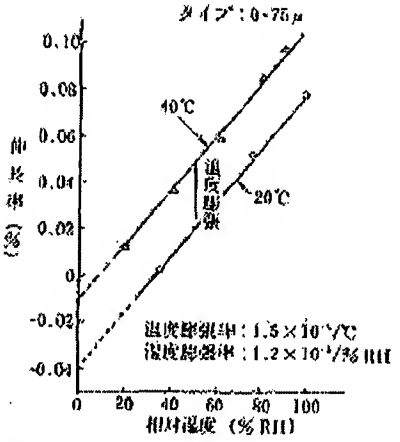
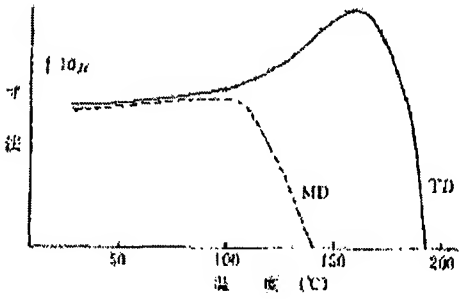


図5 TMAカーブ



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（アイウエオ順）

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